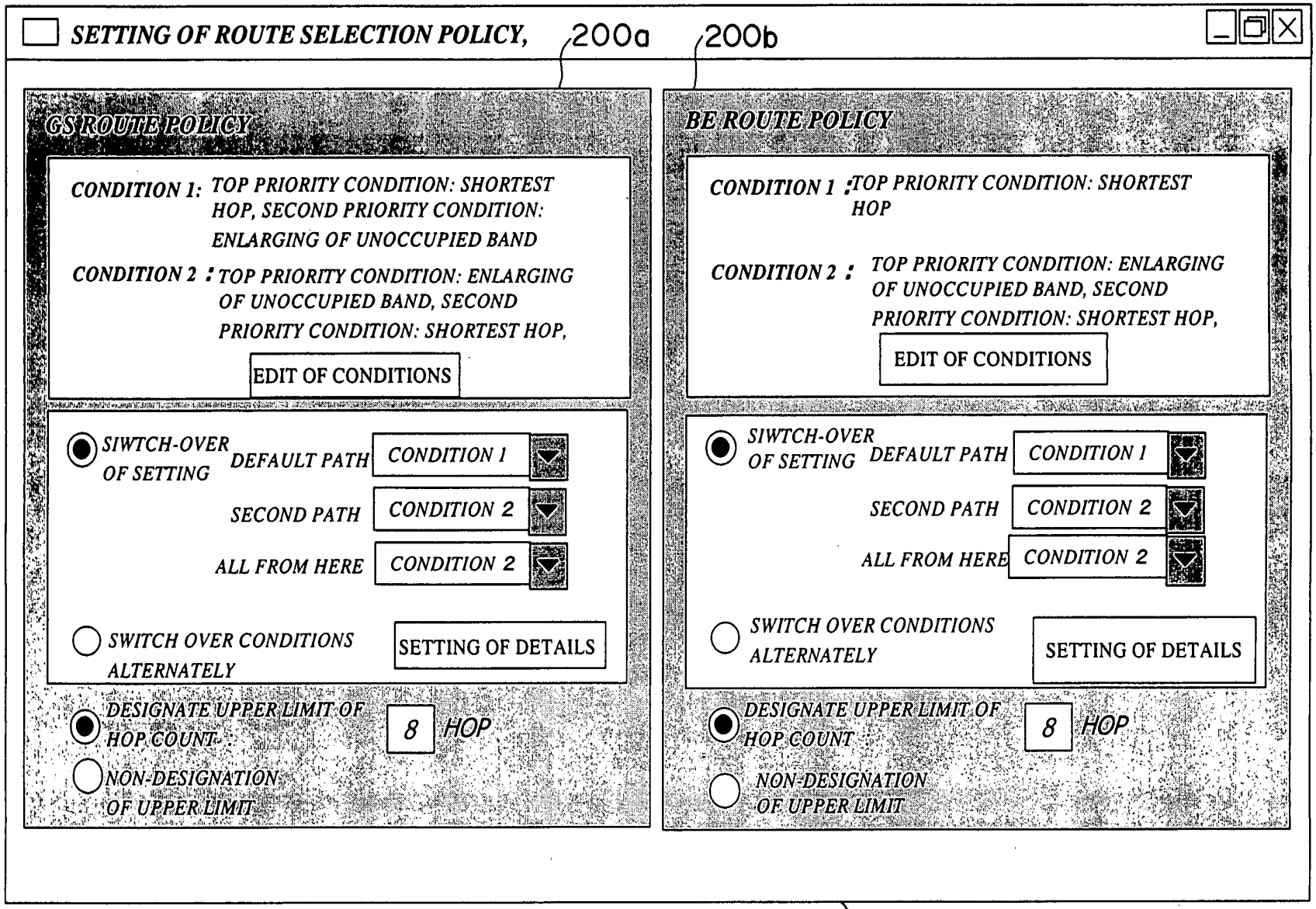

SETTING OF ROUTE SELECTION POLICY,
200a
200b
GS ROUTE POLICY
CONDITION 1: TOP PRIORITY CONDITION: SHORTEST HOP, SECOND PRIORITY CONDITION: ENLARGING OF UNOCCUPIED BAND
CONDITION 2 : TOP PRIORITY CONDITION: ENLARGING OF UNOCCUPIED BAND, SECOND PRIORITY CONDITION: SHORTEST HOP,
EDIT OF CONDITIONS
SIWTCH-OVER OF SETTING
DEFAULT PATH
CONDITION 1
SECOND PATH
CONDITION 2
ALL FROM HERE
CONDITION 2
SWITCH OVER CONDITIONS ALTERNATELY
SETTING OF DETAILS
DESIGNATE UPPER LIMIT OF HOP COUNT
8
HOP
NON-DESIGNATION OF UPPER LIMIT
BE ROUTE POLICY
CONDITION 1 : TOP PRIORITY CONDITION: SHORTEST HOP
CONDITION 2 : TOP PRIORITY CONDITION: ENLARGING OF UNOCCUPIED BAND, SECOND PRIORITY CONDITION: SHORTEST HOP,
EDIT OF CONDITIONS
SIWTCH-OVER OF SETTING
DEFAULT PATH
CONDITION 1
SECOND PATH
CONDITION 2
ALL FROM HERE
CONDITION 2
SWITCH OVER CONDITIONS ALTERNATELY
SETTING OF DETAILS
DESIGNATE UPPER LIMIT OF HOP COUNT
8
HOP
NON-DESIGNATION OF UPPER LIMIT
200

FIG. 1

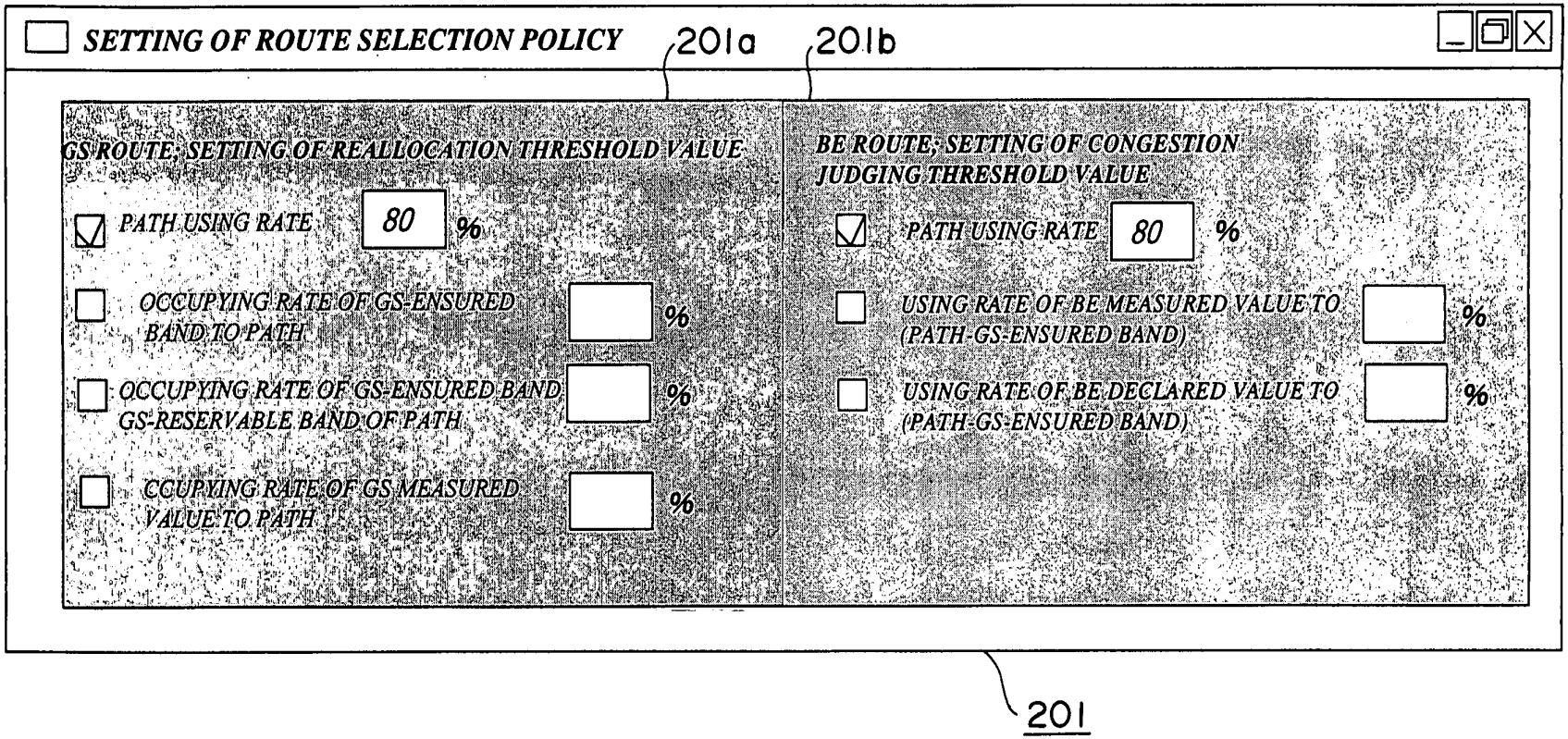

SETTING OF ROUTE SELECTION POLICY
201a
201b
GS ROUTE; SETTING OF REALLOCATION THRESHOLD VALUE
PATH USING RATE
80
%
OCCUPYING RATE OF GS-ENSURED BAND TO PATH
%
OCCUPYING RATE OF GS-ENSURED BAND GS-RESERVABLE BAND OF PATH
%
CCUPYING RATE OF GS MEASURED VALUE TO PATH
%
BE ROUTE; SETTING OF CONGESTION JUDGING THRESHOLD VALUE
PATH USING RATE
80
%
USING RATE OF BE MEASURED VALUE TO (PATH-GS-ENSURED BAND)
%
USING RATE OF BE DECLARED VALUE TO (PATH-GS-ENSURED BAND)
%
201

FIG. 2

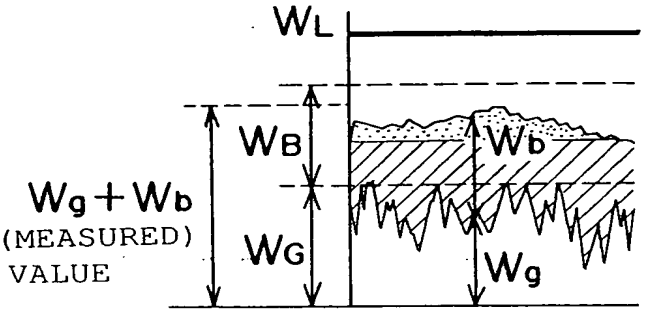


FIG. 3

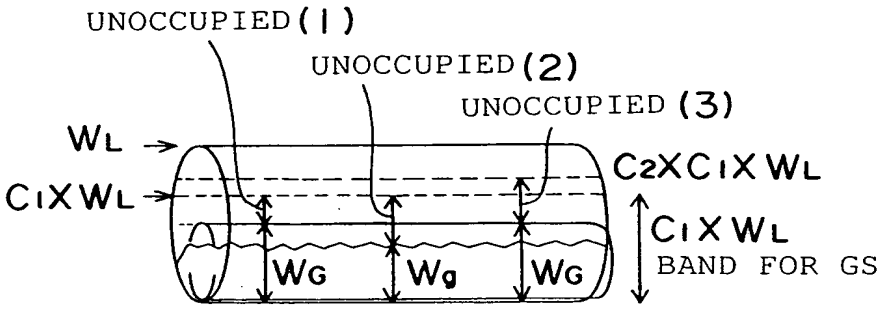

UNOCCUPIED (1)
UNOCCUPIED (2)
UNOCCUPIED (3)
WL
C1XWL
C2XC1XWL
C1XWL
BAND FOR GS
WG
Wg
WG

FIG. 4

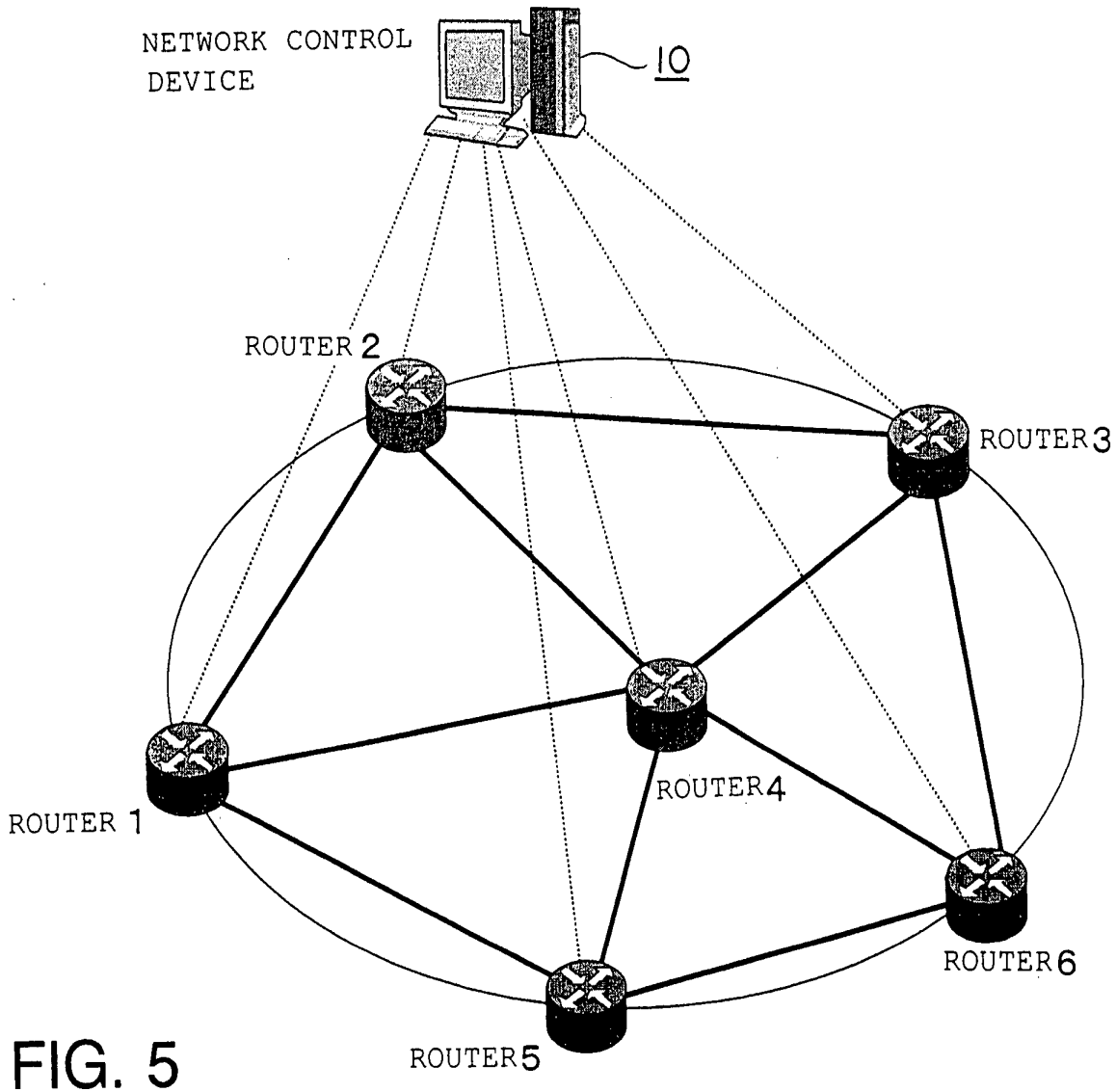

NETWORK CONTROL DEVICE
10
ROUTER 2
ROUTER 3
ROUTER 4
ROUTER 1
ROUTER 6
ROUTER 5

FIG. 5

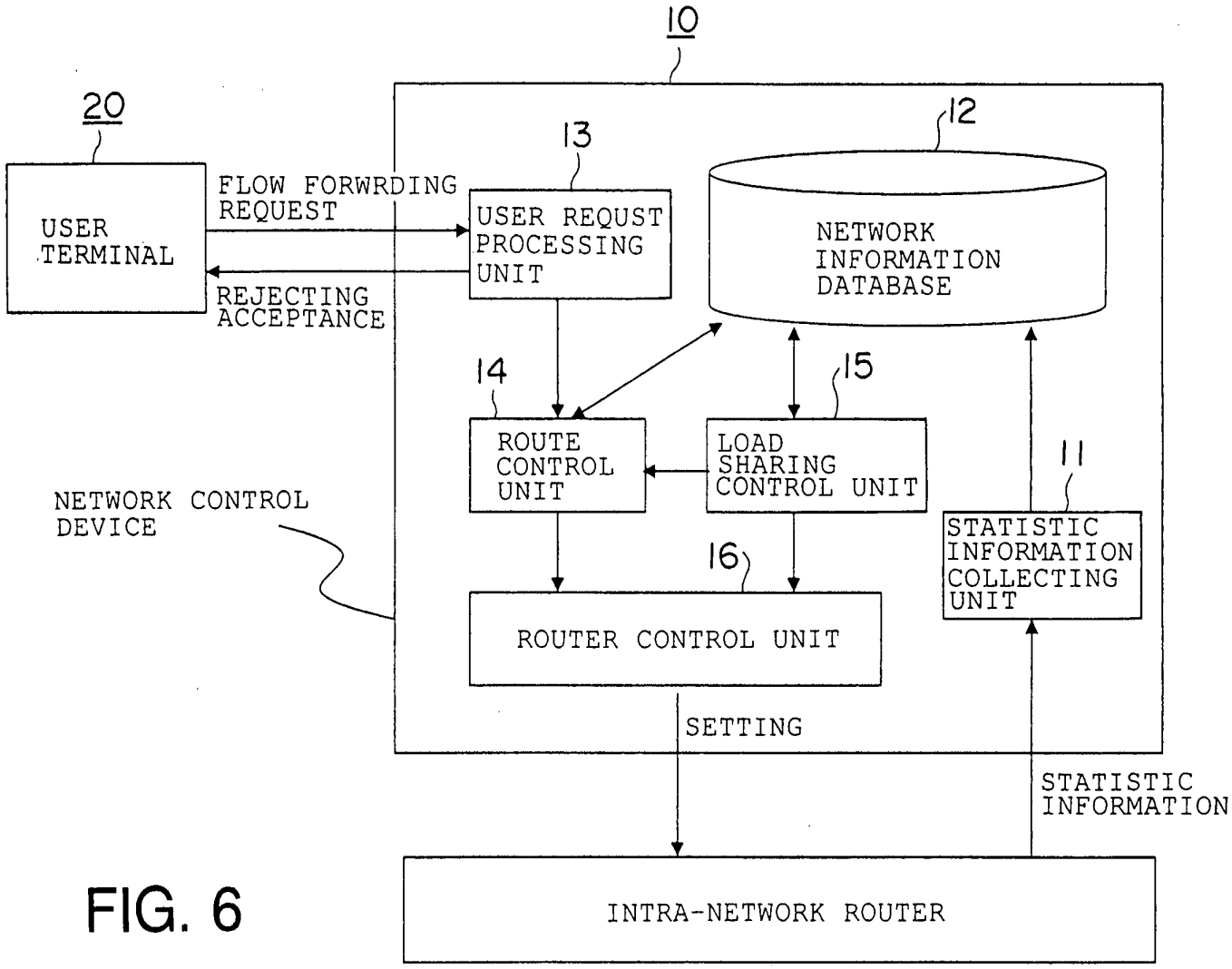
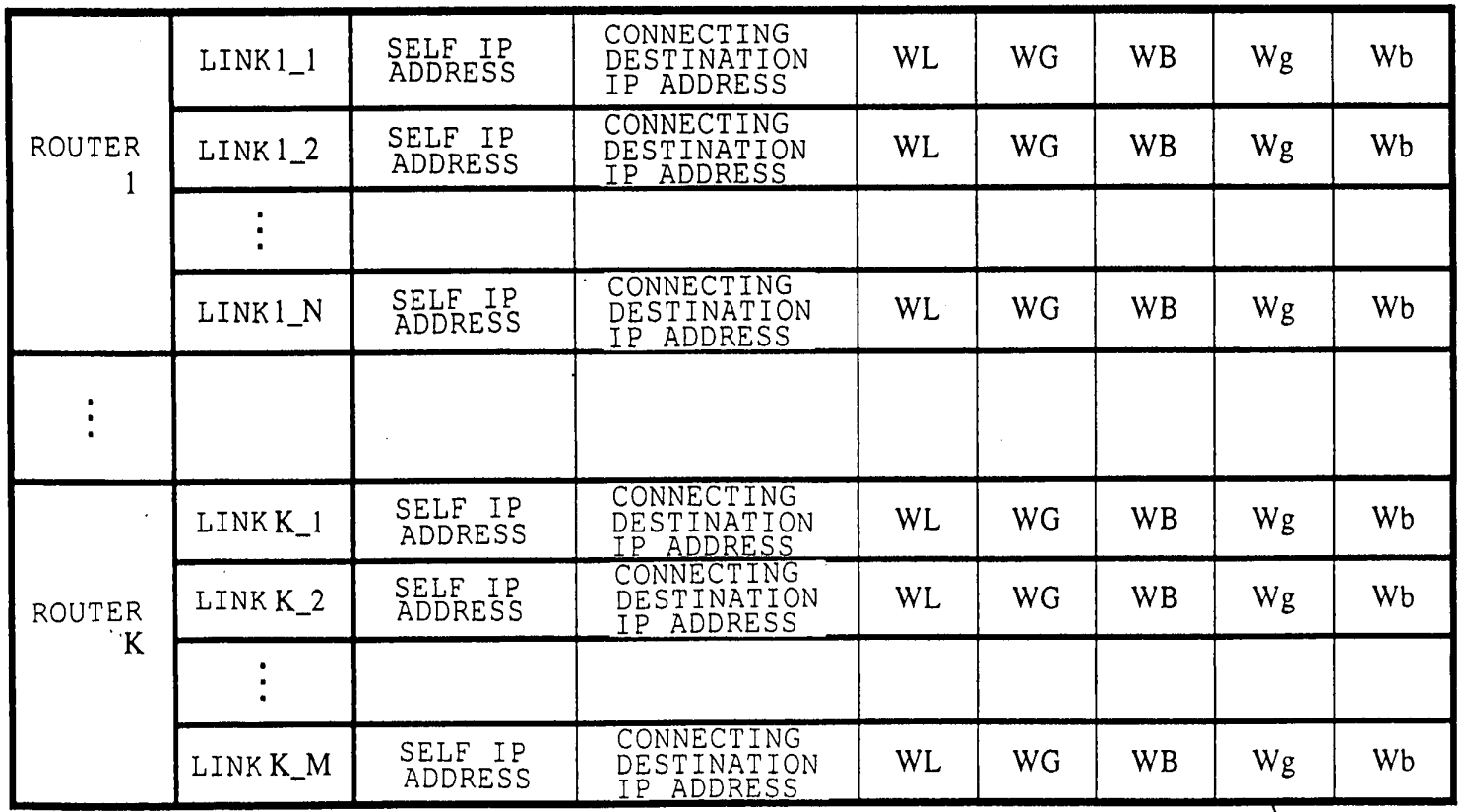

10
20
USER TERMINAL
FLOW FORWRDING REQUEST
REJECTING ACCEPTANCE
13
USER REQUST PROCESSING UNIT
12
NETWORK INFORMATION DATABASE
14
15
ROUTE CONTROL UNIT
LOAD SHARING CONTROL UNIT
11
NETWORK CONTROL DEVICE
16
STATISTIC INFORMATION COLLECTING UNIT
ROUTER CONTROL UNIT
SETTING
STATISTIC INFORMATION
INTRA-NETWORK ROUTER

FIG. 6



ROUTER 1	LINK1_1	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb
	LINK1_2	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb
	⋮							
	LINK1_N	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb
⋮								
ROUTER K	LINK K_1	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb
	LINK K_2	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb
	⋮							
	LINK K_M	SELF IP ADDRESS	CONNECTING DESTINATION IP ADDRESS	WL	WG	WB	Wg	Wb

10b

WL: LINK PHYSICAL BANDWIDTH
WG: BANDWIDTH RESERVED FOR GS FLOW
WB: BANDWIDTH RESERVED FOR BES FLOW
Wg: BANDWIDTH USED FOR GS FLOW
Wb: BANDWIDTH USED FOR BES FLOW

FIG. 7

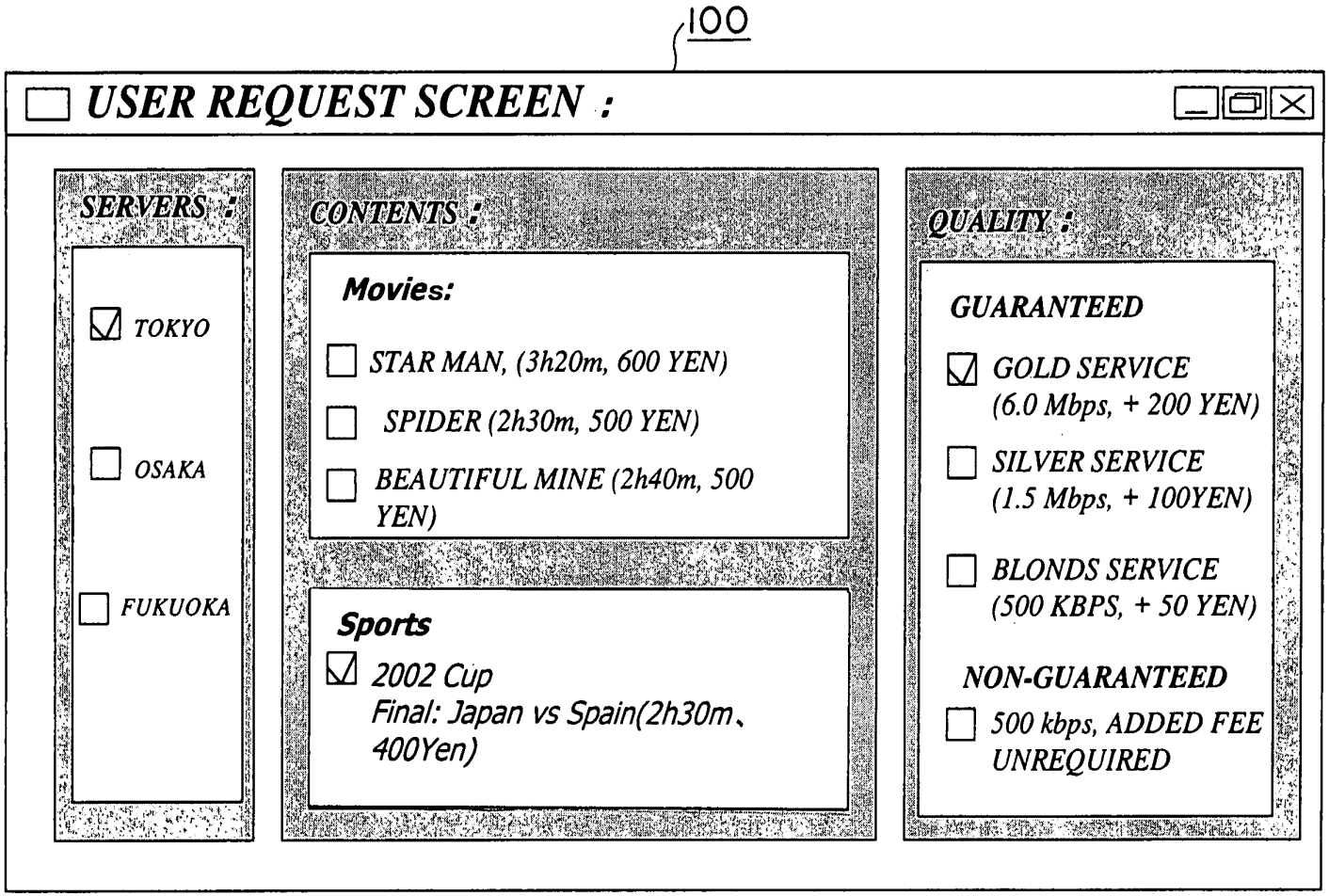

100
USER REQUEST SCREEN :
SERVERS :
TOKYO
OSAKA
FUKUOKA
CONTENTS :
Movies:
STAR MAN, (3h20m, 600 YEN)
SPIDER (2h30m, 500 YEN)
BEAUTIFUL MINE (2h40m, 500 YEN)
Sports
2002 Cup
Final: Japan vs Spain(2h30m、400Yen)
QUALITY :
GUARANTEED
GOLD SERVICE (6.0 Mbps, + 200 YEN)
SILVER SERVICE (1.5 Mbps, + 100YEN)
BLONDS SERVICE (500 KBPS, + 50 YEN)
NON-GUARANTEED
500 kbps, ADDED FEE UNREQUIRED

FIG. 8

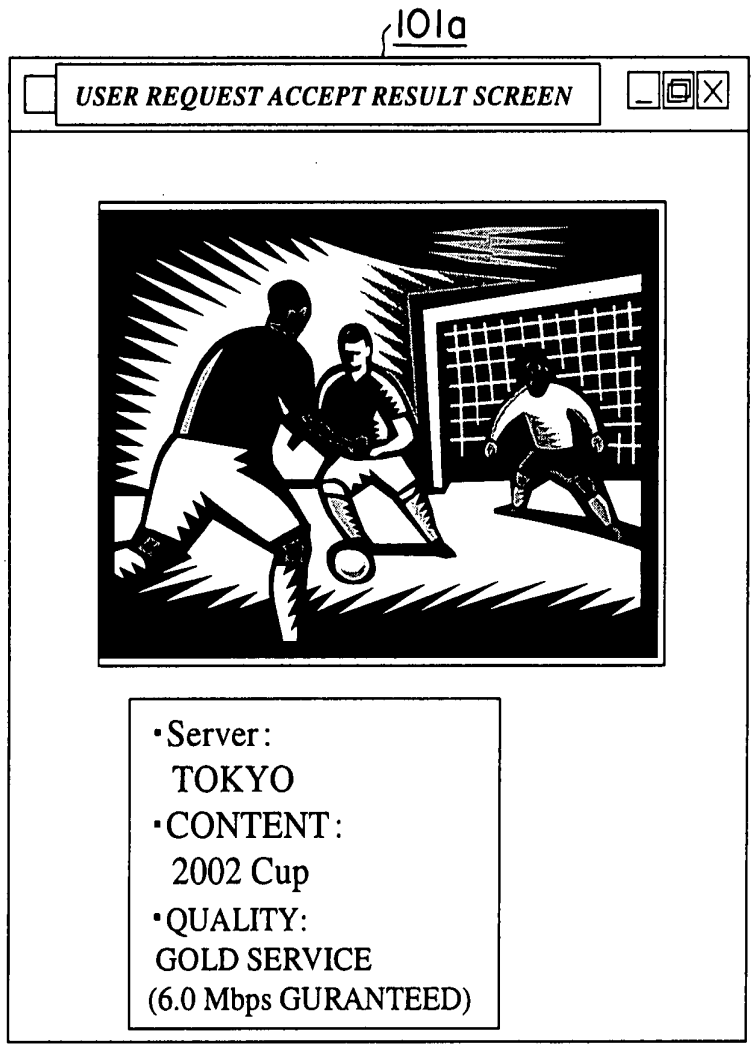

101a
USER REQUEST ACCEPT RESULT SCREEN
•Server:
TOKYO
•CONTENT:
2002 Cup
•QUALITY:
GOLD SERVICE
(6.0 Mbps GURANTEED)

FIG. 9

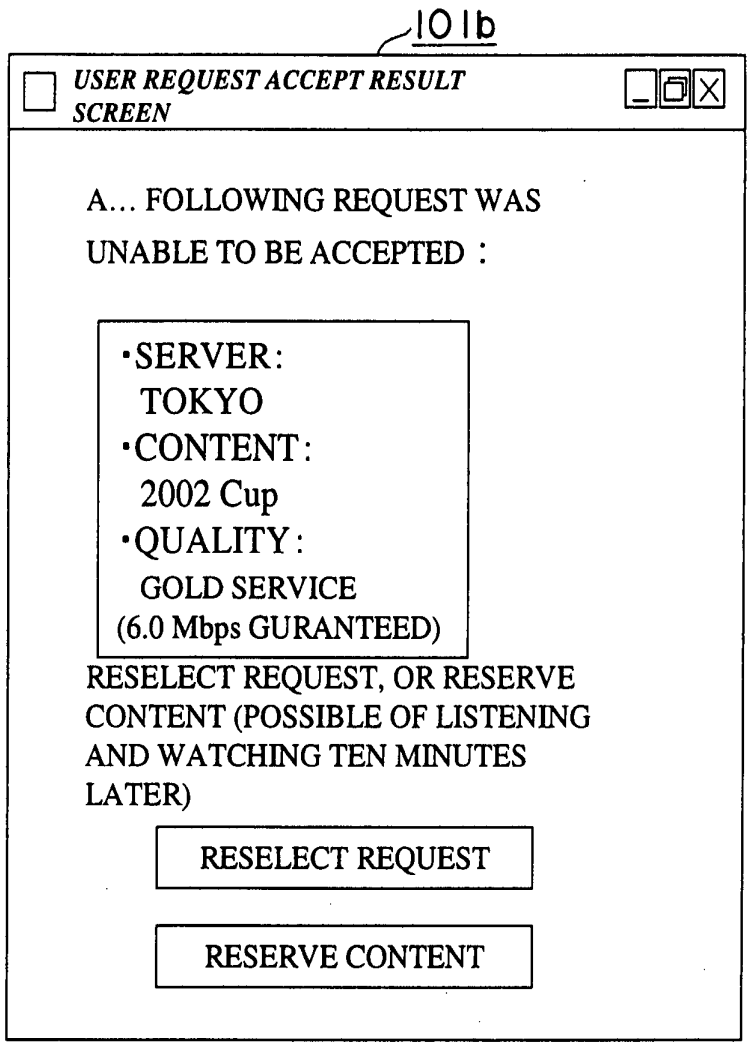

101b
USER REQUEST ACCEPT RESULT SCREEN
A... FOLLOWING REQUEST WAS UNABLE TO BE ACCEPTED :
・SERVER:
TOKYO
・CONTENT:
2002 Cup
・QUALITY:
GOLD SERVICE
(6.0 Mbps GURANTEED)
RESELECT REQUEST, OR RESERVE CONTENT (POSSIBLE OF LISTENING AND WATCHING TEN MINUTES LATER)
RESELECT REQUEST
RESERVE CONTENT

FIG. 10

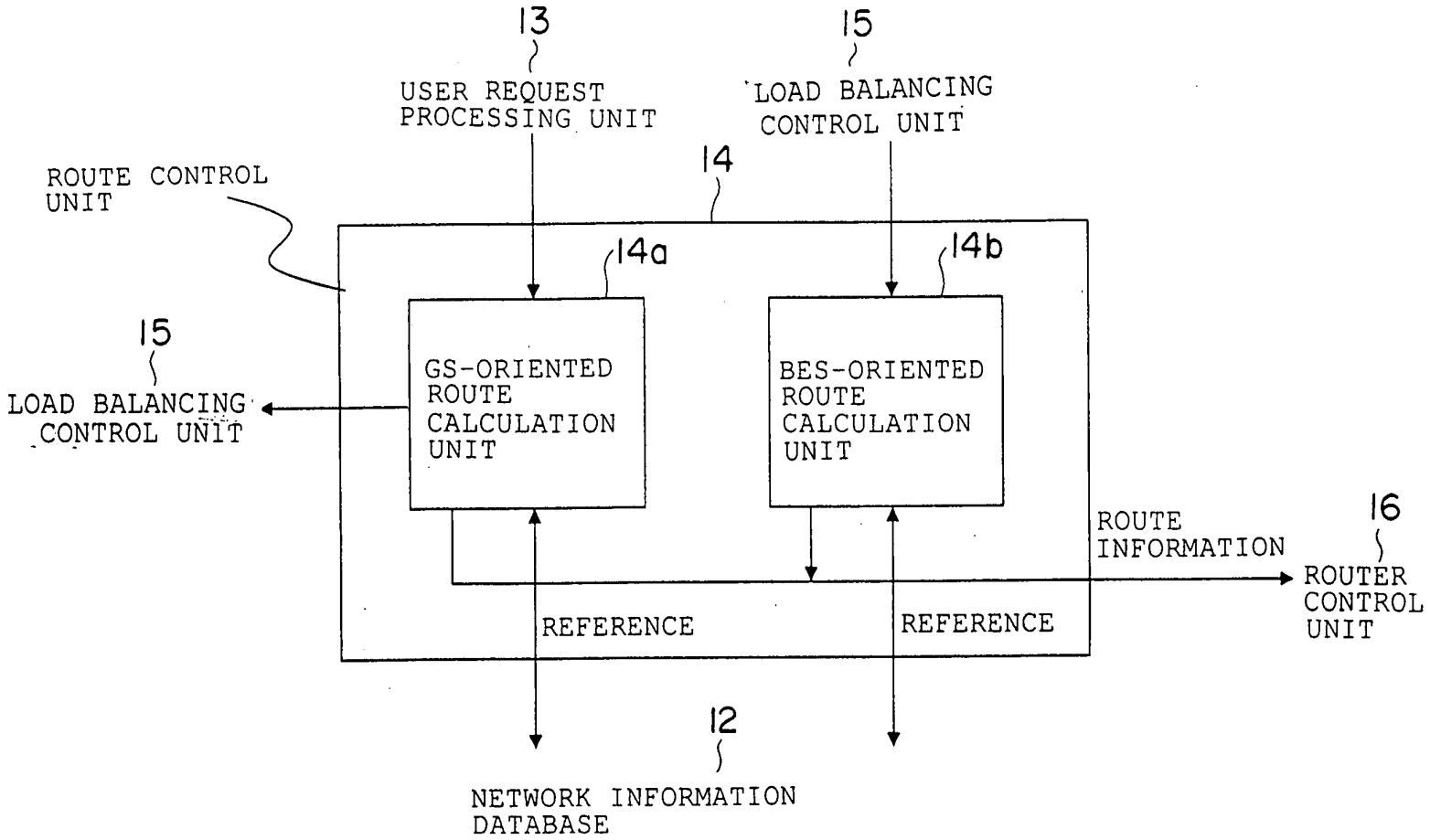

13
USER REQUEST PROCESSING UNIT
15
LOAD BALANCING CONTROL UNIT
14
ROUTE CONTROL UNIT
14a
14b
15
LOAD BALANCING CONTROL UNIT
GS-ORIENTED ROUTE CALCULATION UNIT
BES-ORIENTED ROUTE CALCULATION UNIT
ROUTE INFORMATION
16
ROUTER CONTROL UNIT
REFERENCE
REFERENCE
12
NETWORK INFORMATION DATABASE

FIG. 11

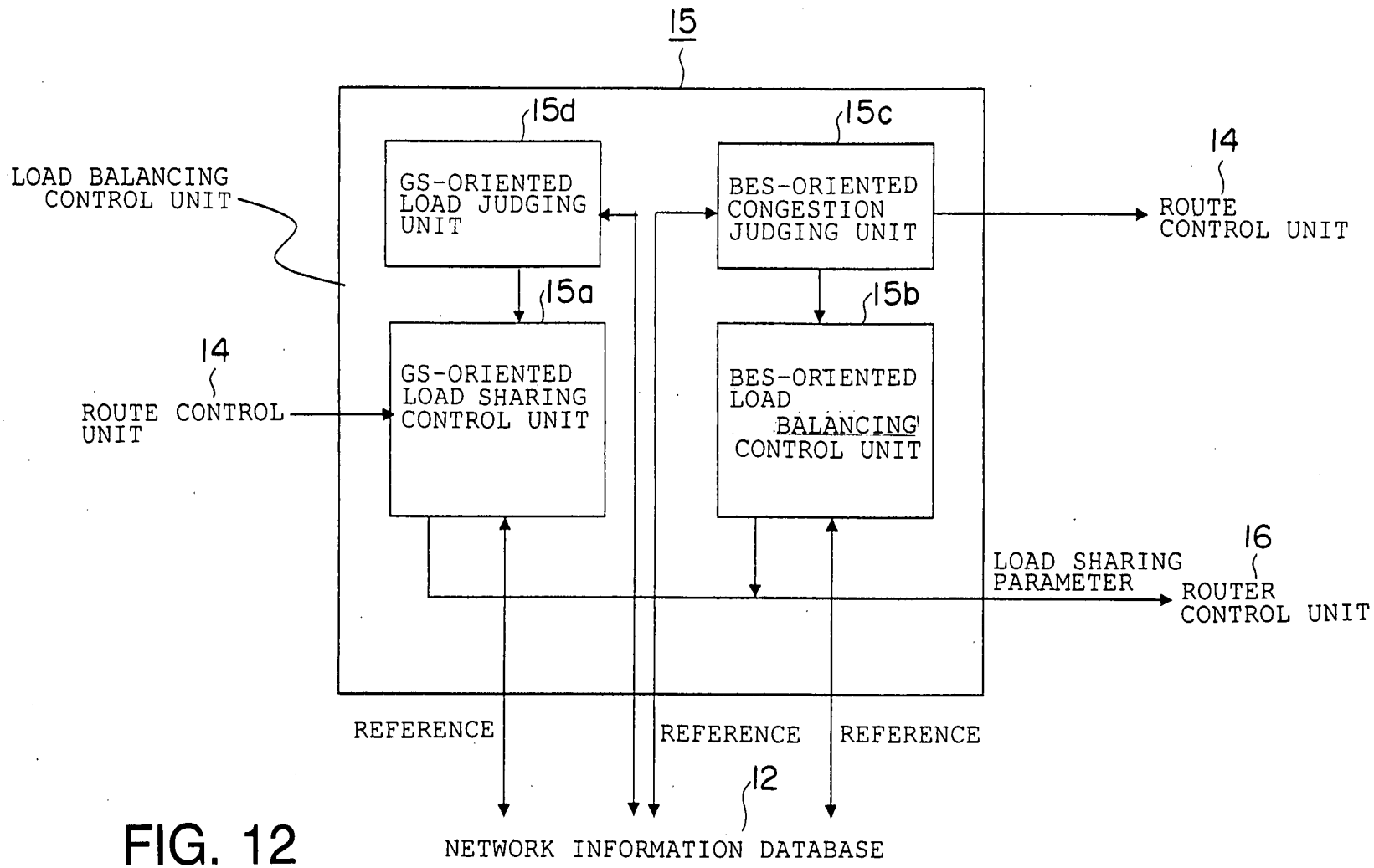

15
15d
15c
LOAD BALANCING CONTROL UNIT
GS-ORIENTED LOAD JUDGING UNIT
BES-ORIENTED CONGESTION JUDGING UNIT
14
ROUTE CONTROL UNIT
15a
15b
14
ROUTE CONTROL UNIT
GS-ORIENTED LOAD SHARING CONTROL UNIT
BES-ORIENTED LOAD BALANCING CONTROL UNIT
16
LOAD SHARING PARAMETER
ROUTER CONTROL UNIT
REFERENCE
REFERENCE
REFERENCE
12
NETWORK INFORMATION DATABASE

FIG. 12

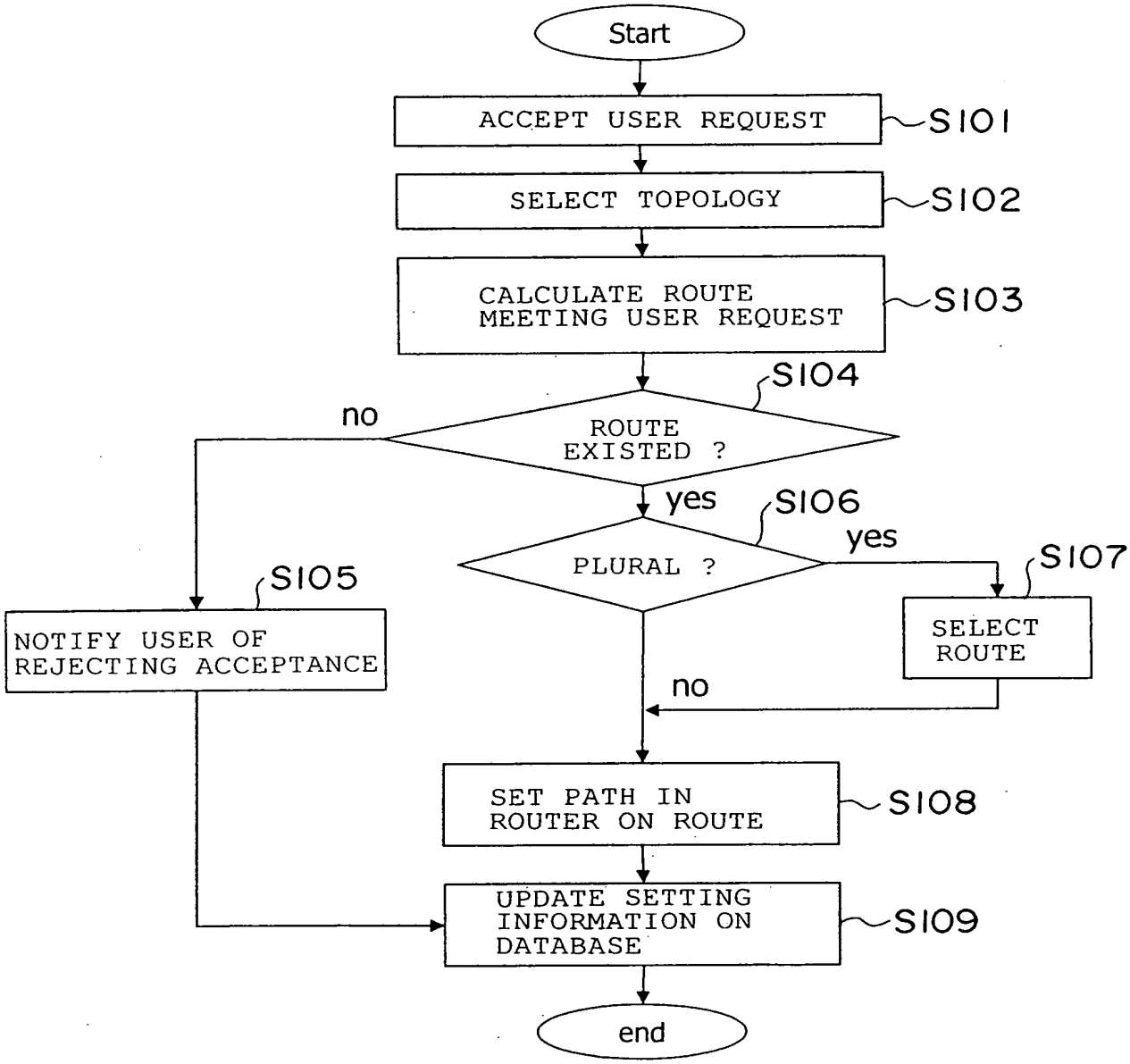

Start
ACCEPT USER REQUEST
S101
SELECT TOPOLOGY
S102
CALCULATE ROUTE MEETING USER REQUEST
S103
S104
ROUTE EXISTED ?
no
yes
S106
PLURAL ?
yes
S107
SELECT ROUTE
S105
NOTIFY USER OF REJECTING ACCEPTANCE
no
SET PATH IN ROUTER ON ROUTE
S108
UPDATE SETTING INFORMATION ON DATABASE
S109
end

FIG. 13

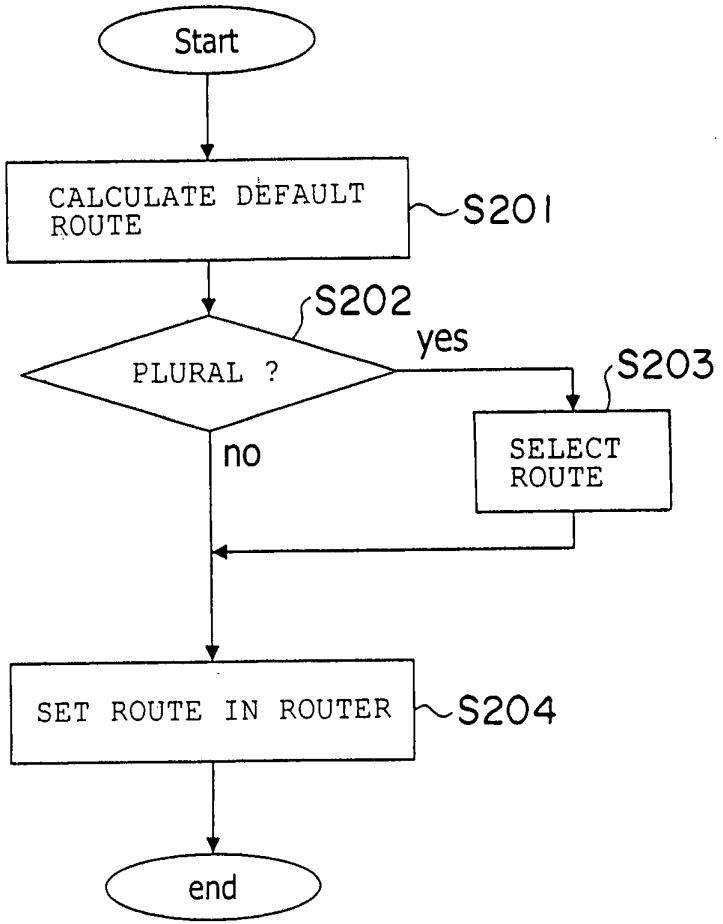

Start
CALCULATE DEFAULT ROUTE
S201
S202
PLURAL ?
yes
S203
SELECT ROUTE
no
SET ROUTE IN ROUTER
S204
end

FIG. 14

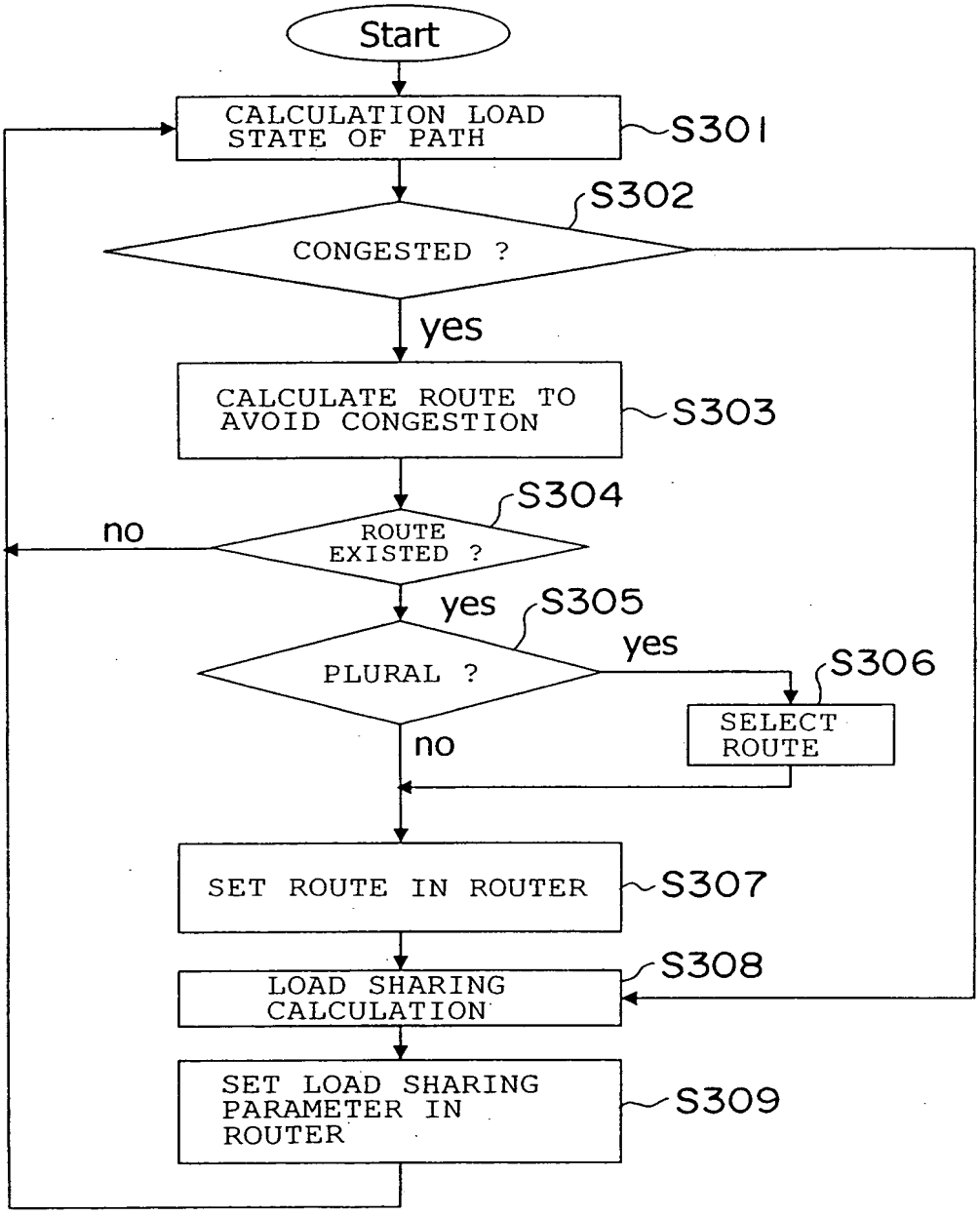

Start
CALCULATION LOAD STATE OF PATH
S301
S302
CONGESTED ?
yes
CALCULATE ROUTE TO AVOID CONGESTION
S303
S304
no
ROUTE EXISTED ?
yes
S305
yes
PLURAL ?
S306
SELECT ROUTE
no
SET ROUTE IN ROUTER
S307
S308
LOAD SHARING CALCULATION
SET LOAD SHARING PARAMETER IN ROUTER
S309

FIG. 15

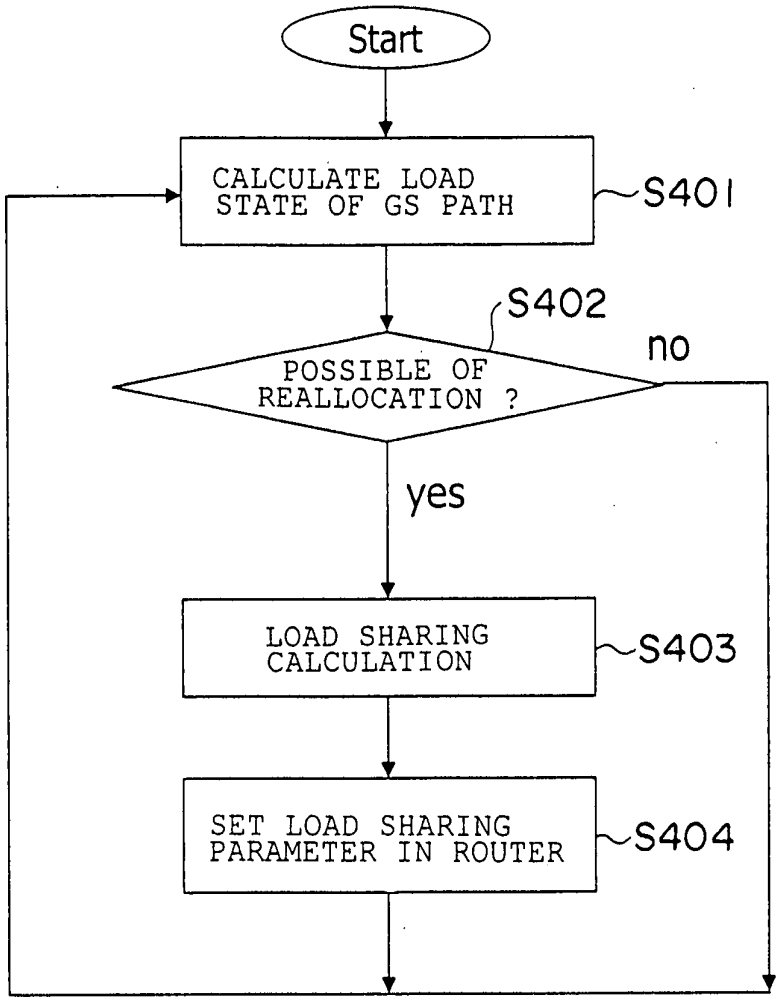

Start
CALCULATE LOAD STATE OF GS PATH
S401
S402
POSSIBLE OF REALLOCATION ?
no
yes
LOAD SHARING CALCULATION
S403
SET LOAD SHARING PARAMETER IN ROUTER
S404

FIG. 16

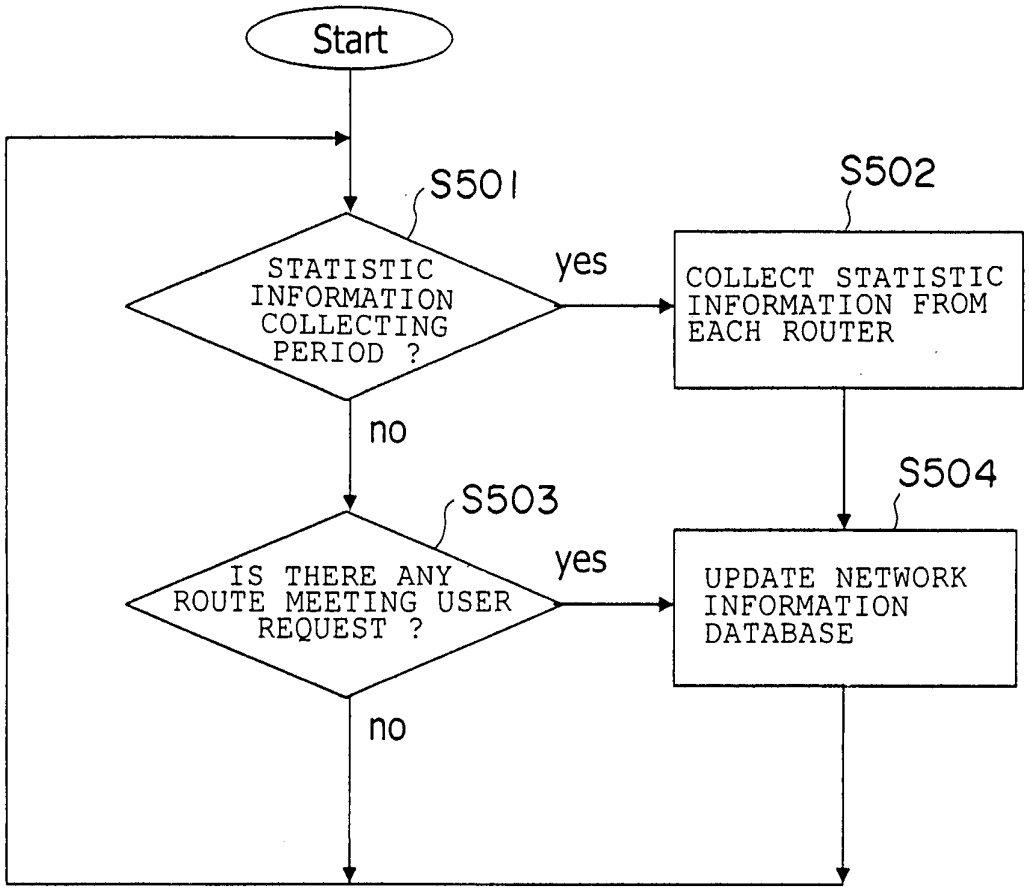

Start
S501
STATISTIC INFORMATION COLLECTING PERIOD ?
yes
no
S502
COLLECT STATISTIC INFORMATION FROM EACH ROUTER
S503
IS THERE ANY ROUTE MEETING USER REQUEST ?
yes
no
S504
UPDATE NETWORK INFORMATION DATABASE

FIG. 17

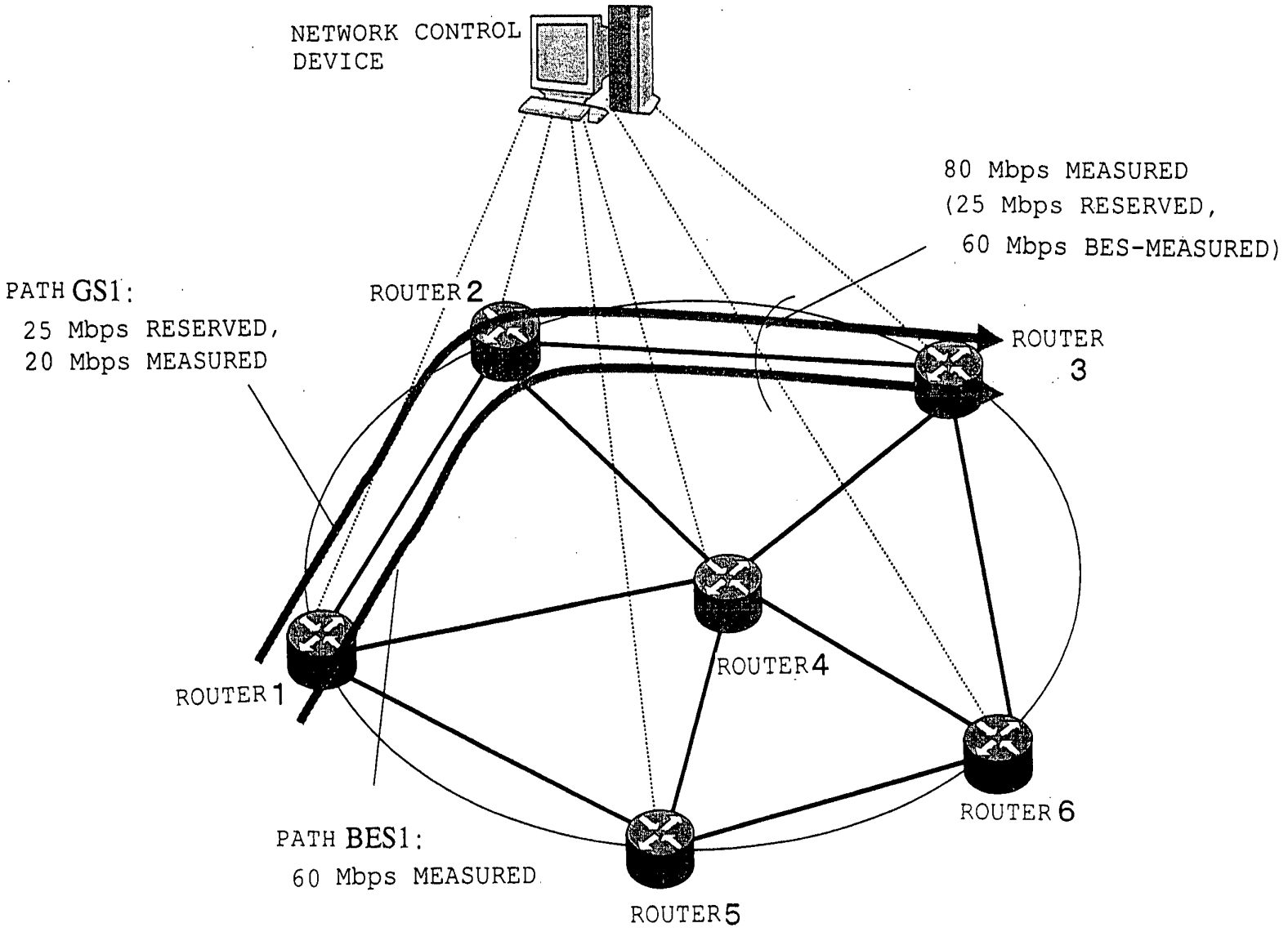

NETWORK CONTROL DEVICE
80 Mbps MEASURED
(25 Mbps RESERVED,
60 Mbps BES-MEASURED)
PATH GS1:
25 Mbps RESERVED,
20 Mbps MEASURED
ROUTER 2
ROUTER 3
ROUTER 1
ROUTER 4
ROUTER 6
PATH BES1:
60 Mbps MEASURED
ROUTER 5

FIG. 18

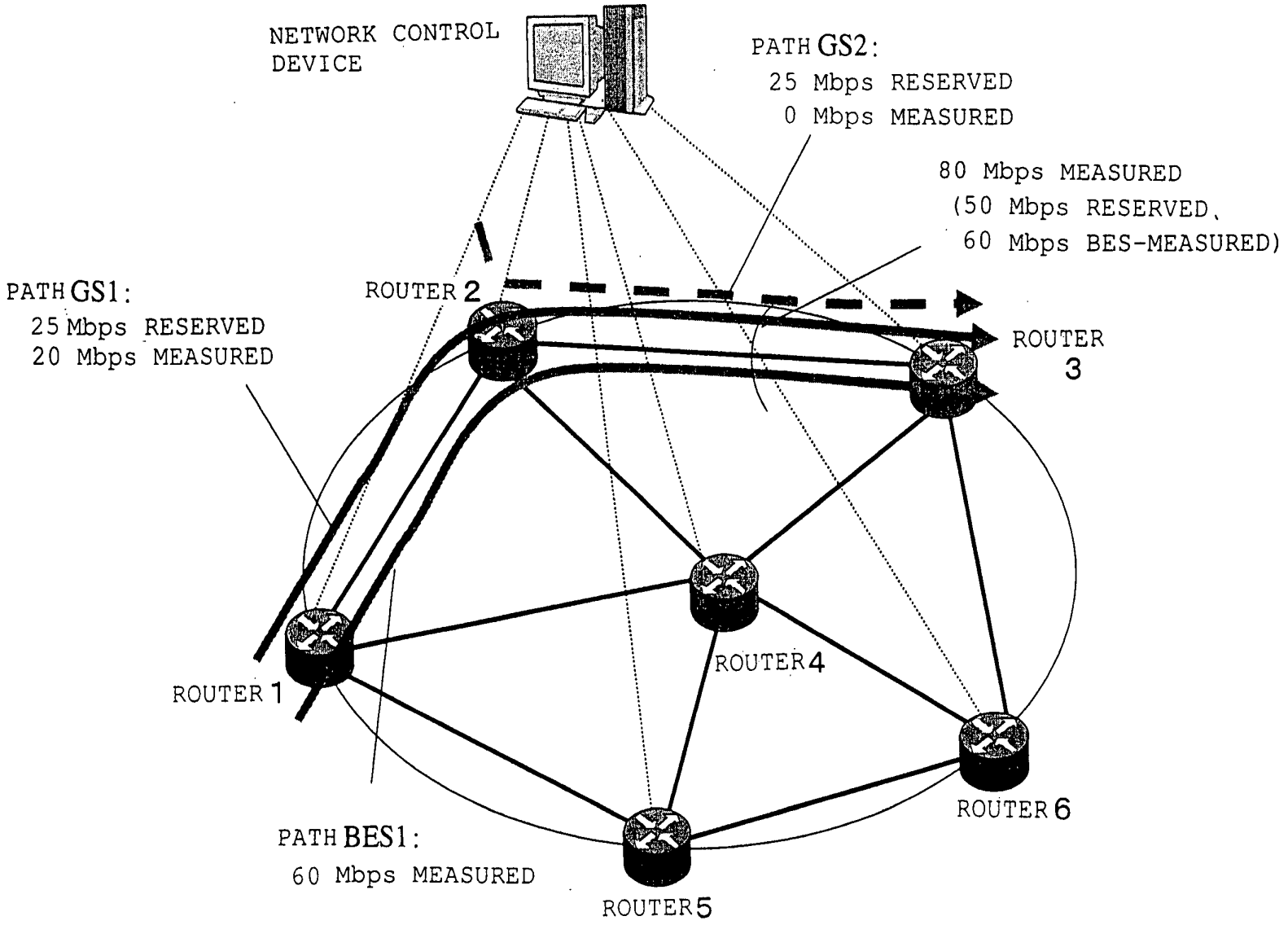

NETWORK CONTROL DEVICE
PATH GS2:
25 Mbps RESERVED
0 Mbps MEASURED
80 Mbps MEASURED
(50 Mbps RESERVED、
60 Mbps BES-MEASURED)
PATH GS1:
25 Mbps RESERVED
20 Mbps MEASURED
ROUTER 2
ROUTER 3
ROUTER 1
ROUTER 4
ROUTER 6
PATH BES1:
60 Mbps MEASURED
ROUTER 5

FIG. 19

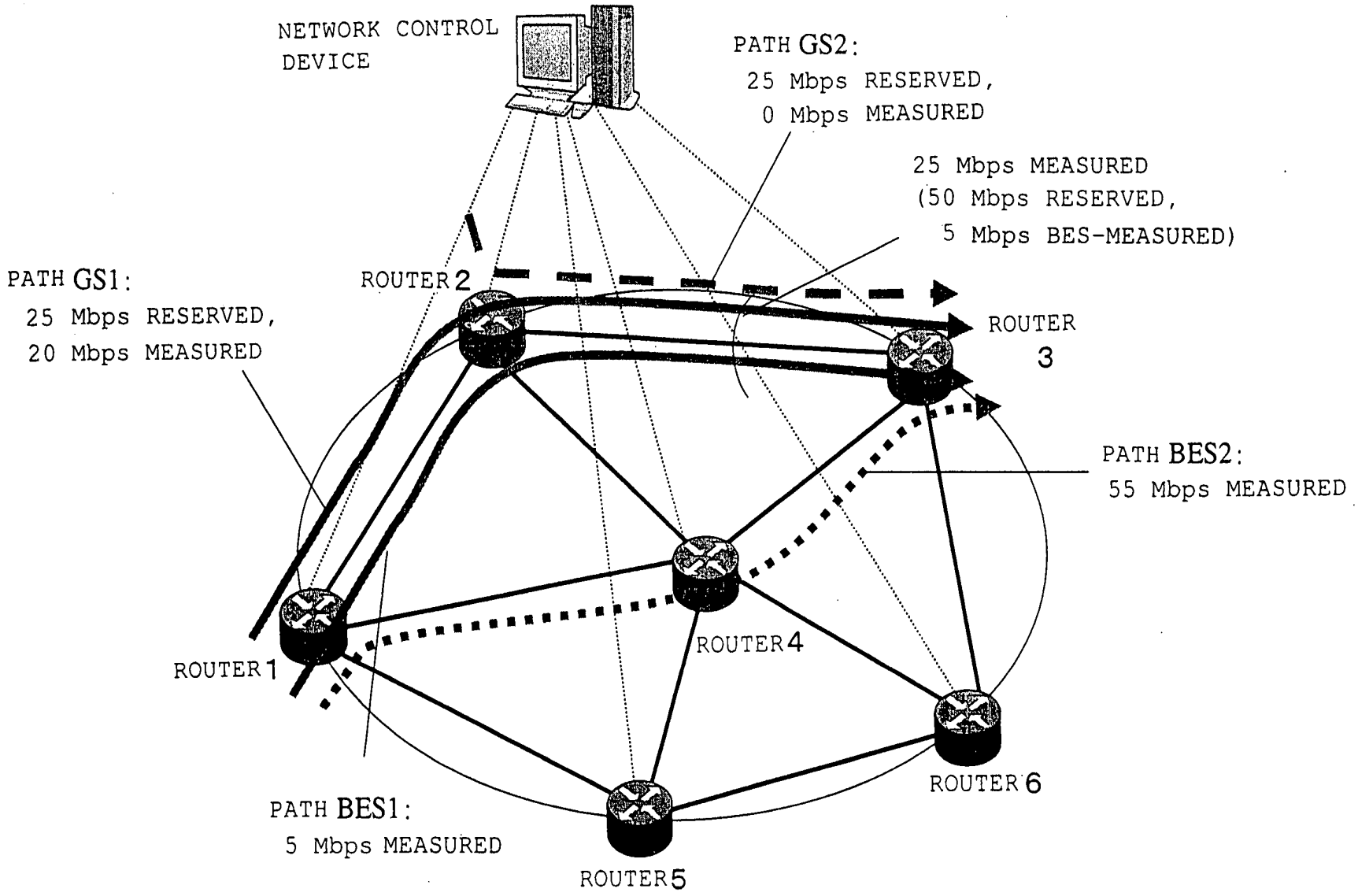

NETWORK CONTROL DEVICE
PATH GS2:
25 Mbps RESERVED,
0 Mbps MEASURED
25 Mbps MEASURED
(50 Mbps RESERVED,
5 Mbps BES-MEASURED)
PATH GS1:
25 Mbps RESERVED,
20 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH BES2:
55 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 6
PATH BES1:
5 Mbps MEASURED
ROUTER 5

FIG. 20

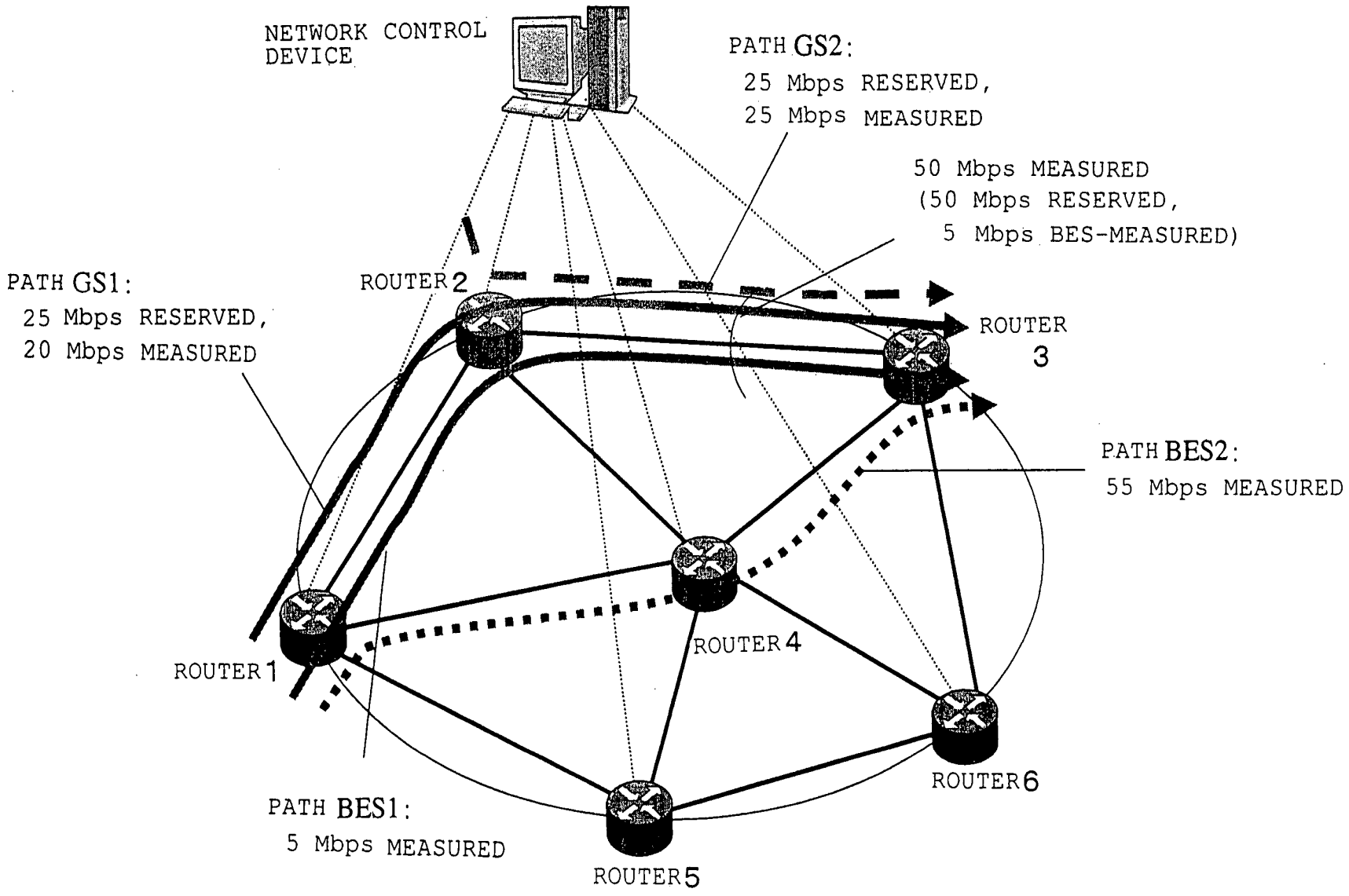

NETWORK CONTROL DEVICE
PATH GS2:
25 Mbps RESERVED,
25 Mbps MEASURED
50 Mbps MEASURED
(50 Mbps RESERVED,
5 Mbps BES-MEASURED)
PATH GS1:
25 Mbps RESERVED,
20 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH BES2:
55 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 6
PATH BES1:
5 Mbps MEASURED
ROUTER 5

FIG. 21

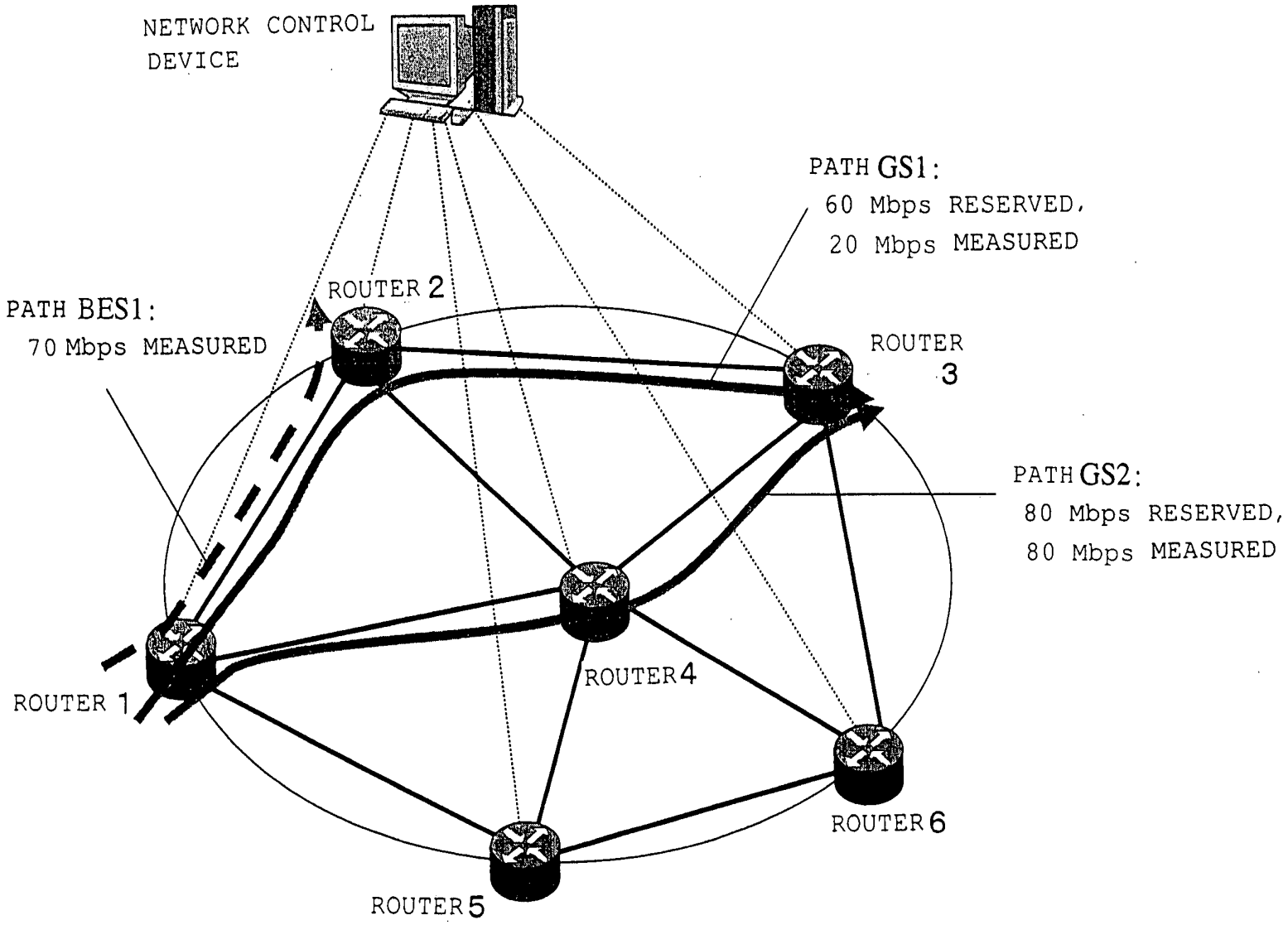

NETWORK CONTROL DEVICE
PATH GS1:
60 Mbps RESERVED,
20 Mbps MEASURED
PATH BES1:
70 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
80 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 5
ROUTER 6

FIG. 22

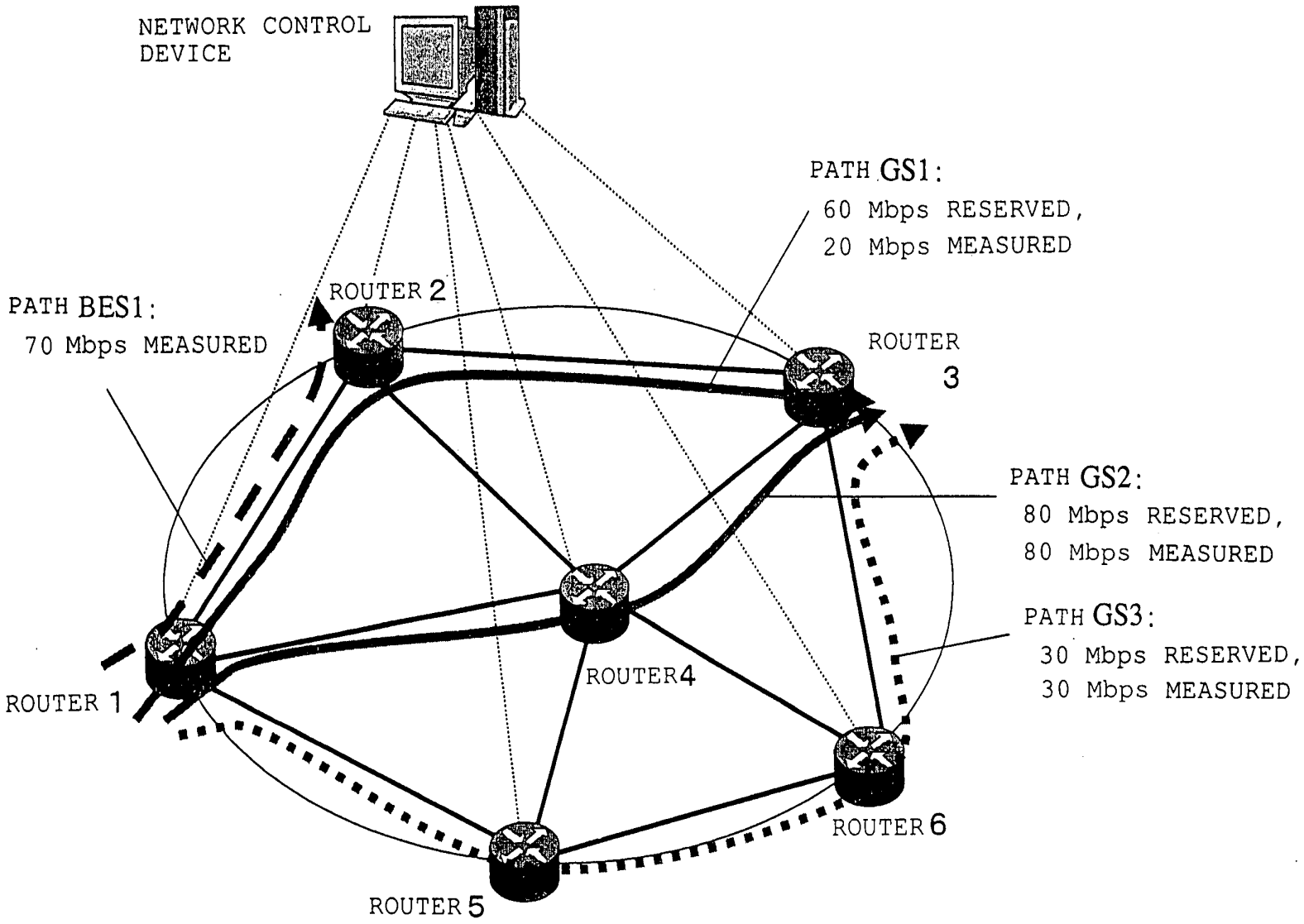

NETWORK CONTROL DEVICE
PATH GS1:
60 Mbps RESERVED,
20 Mbps MEASURED
PATH BES1:
70 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
80 Mbps MEASURED
PATH GS3:
30 Mbps RESERVED,
30 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 5
ROUTER 6

FIG. 23

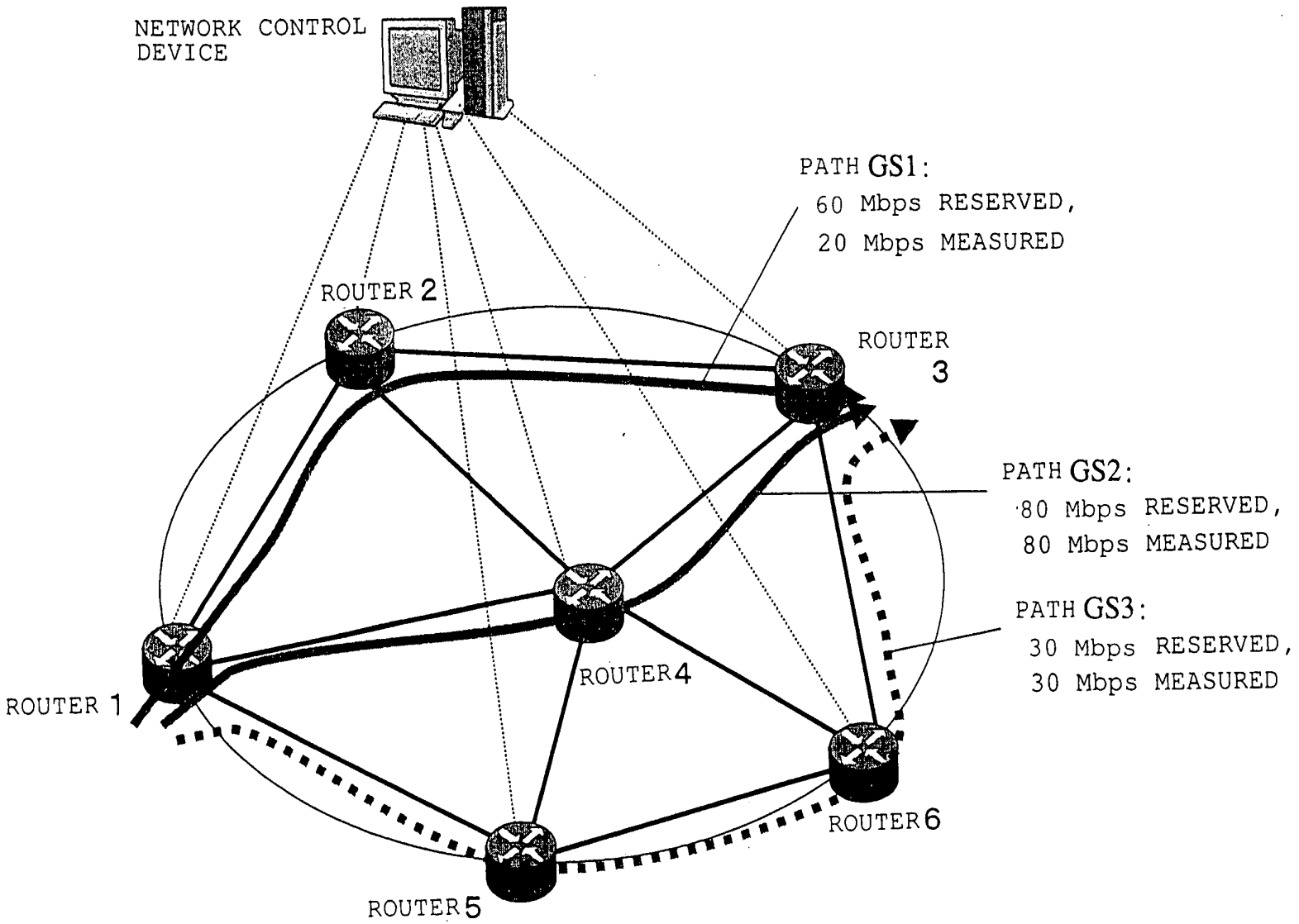

NETWORK CONTROL DEVICE
PATH GS1:
60 Mbps RESERVED,
20 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
80 Mbps MEASURED
PATH GS3:
30 Mbps RESERVED,
30 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 6
ROUTER 5

FIG. 24

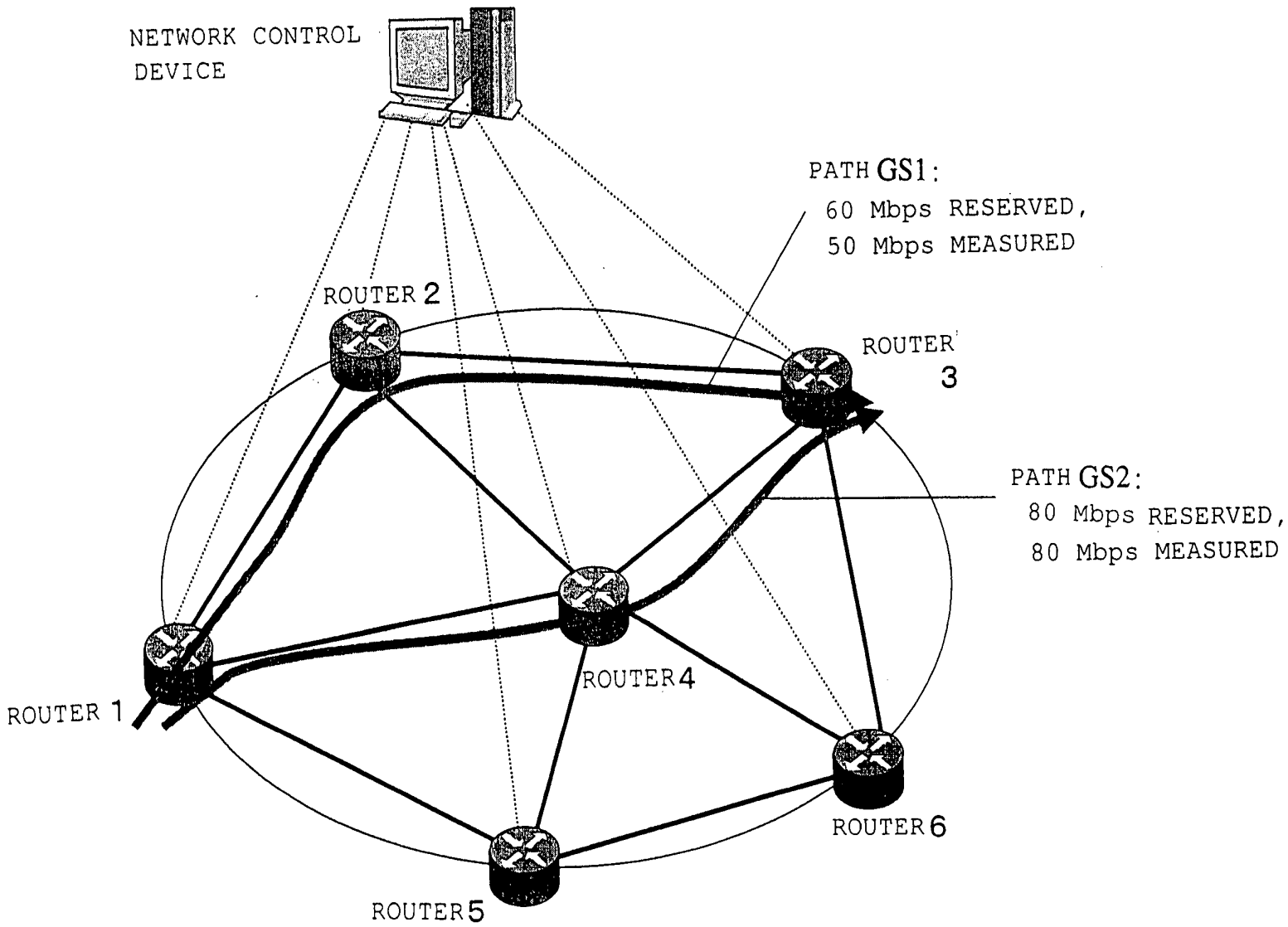

NETWORK CONTROL DEVICE
PATH GS1:
60 Mbps RESERVED,
50 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
80 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 6
ROUTER 5

FIG. 25

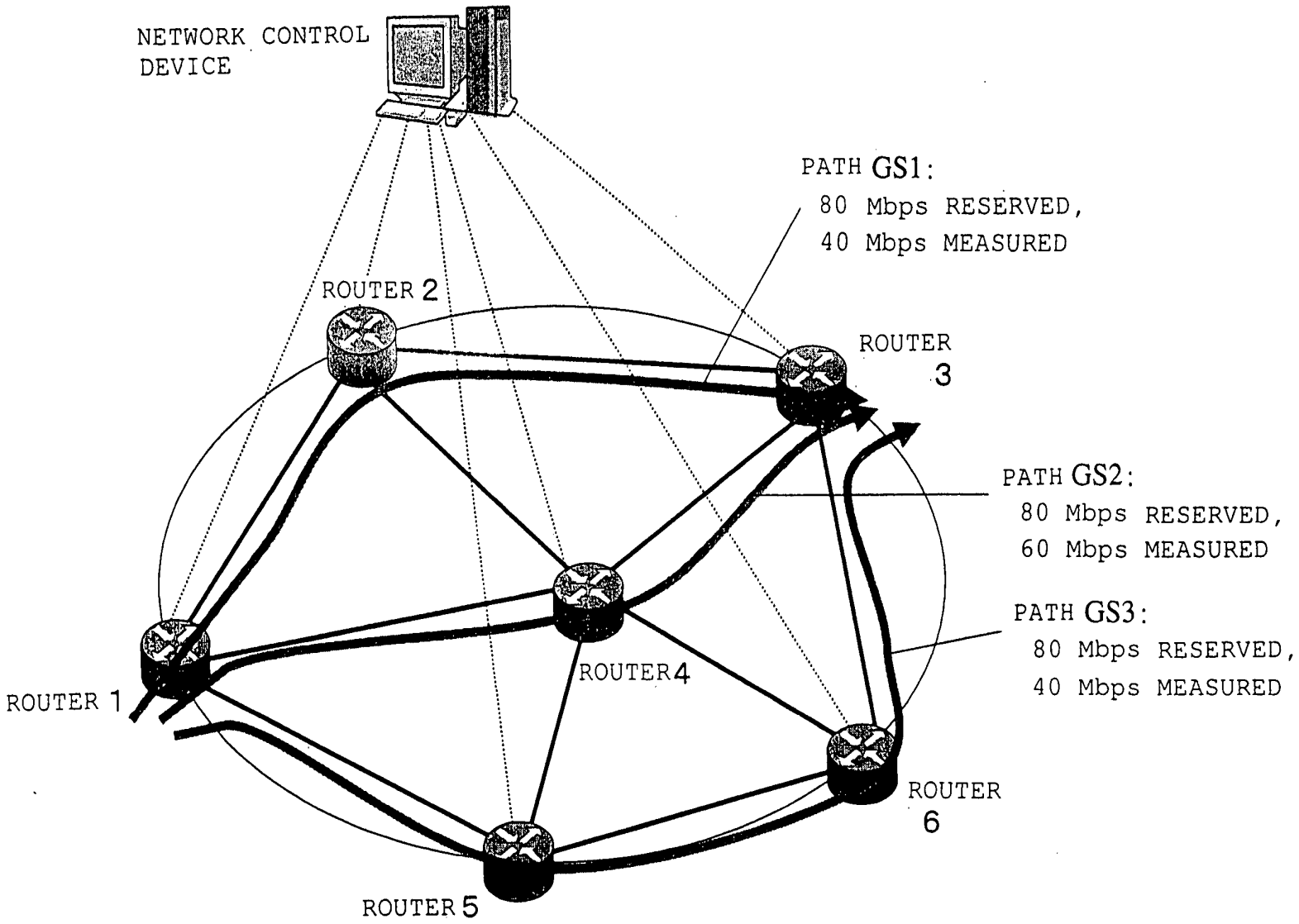

NETWORK CONTROL DEVICE
PATH GS1:
80 Mbps RESERVED,
40 Mbps MEASURED
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
60 Mbps MEASURED
PATH GS3:
80 Mbps RESERVED,
40 Mbps MEASURED
ROUTER 1
ROUTER 4
ROUTER 6
ROUTER 5

FIG. 26

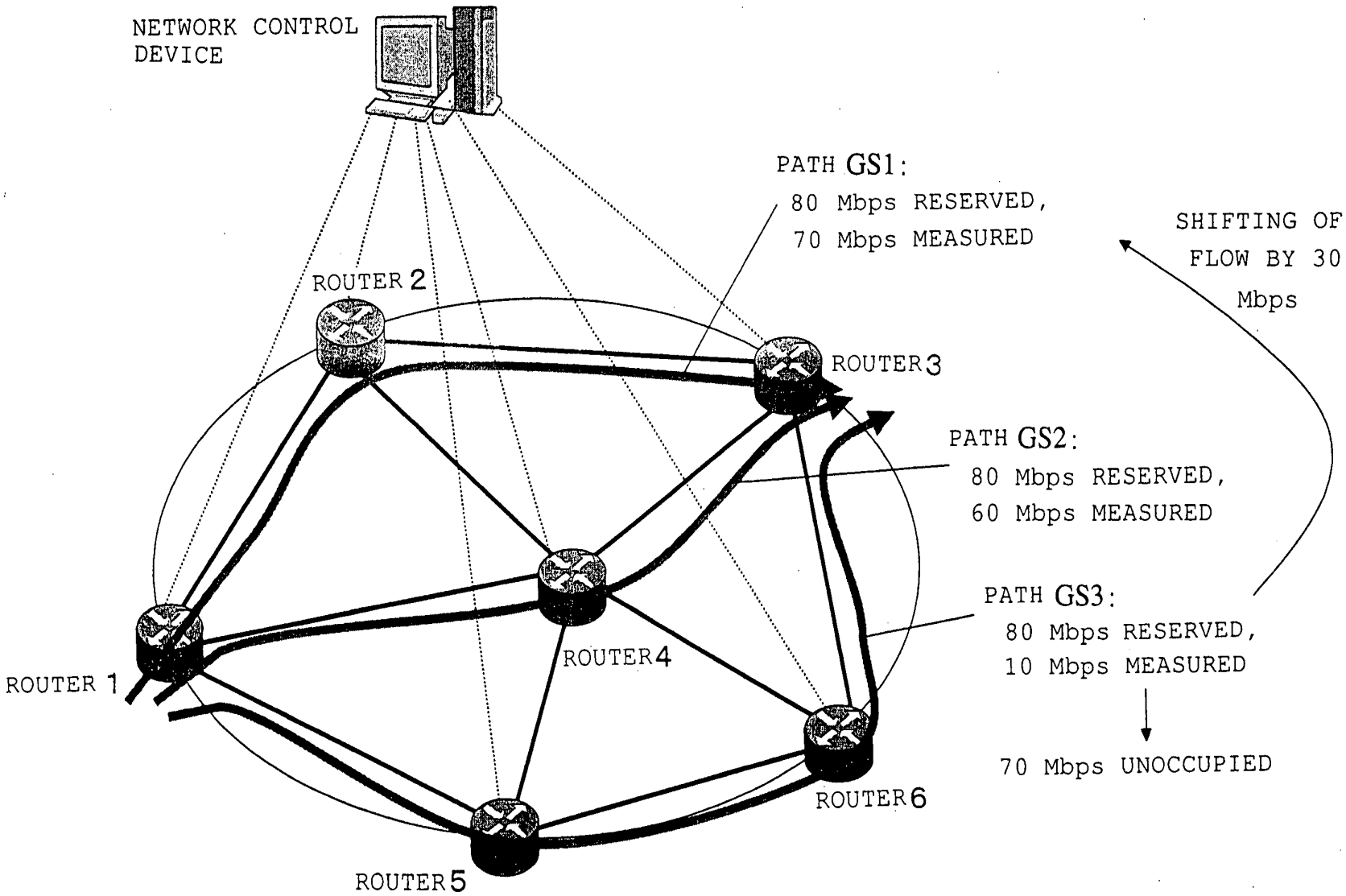

NETWORK CONTROL DEVICE
PATH GS1:
80 Mbps RESERVED,
70 Mbps MEASURED
SHIFTING OF FLOW BY 30 Mbps
ROUTER 2
ROUTER 3
PATH GS2:
80 Mbps RESERVED,
60 Mbps MEASURED
PATH GS3:
80 Mbps RESERVED,
10 Mbps MEASURED
ROUTER 4
ROUTER 1
70 Mbps UNOCCUPIED
ROUTER 6
ROUTER 5

FIG. 27

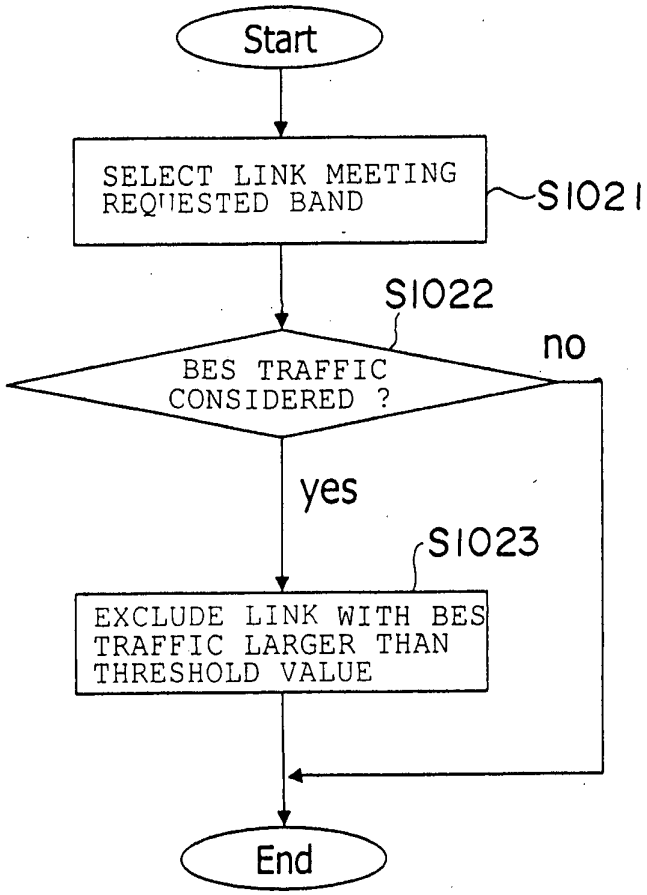

Start
SELECT LINK MEETING REQUESTED BAND
S1021
S1022
BES TRAFFIC CONSIDERED ?
no
yes
S1023
EXCLUDE LINK WITH BES TRAFFIC LARGER THAN THRESHOLD VALUE
End

FIG. 28

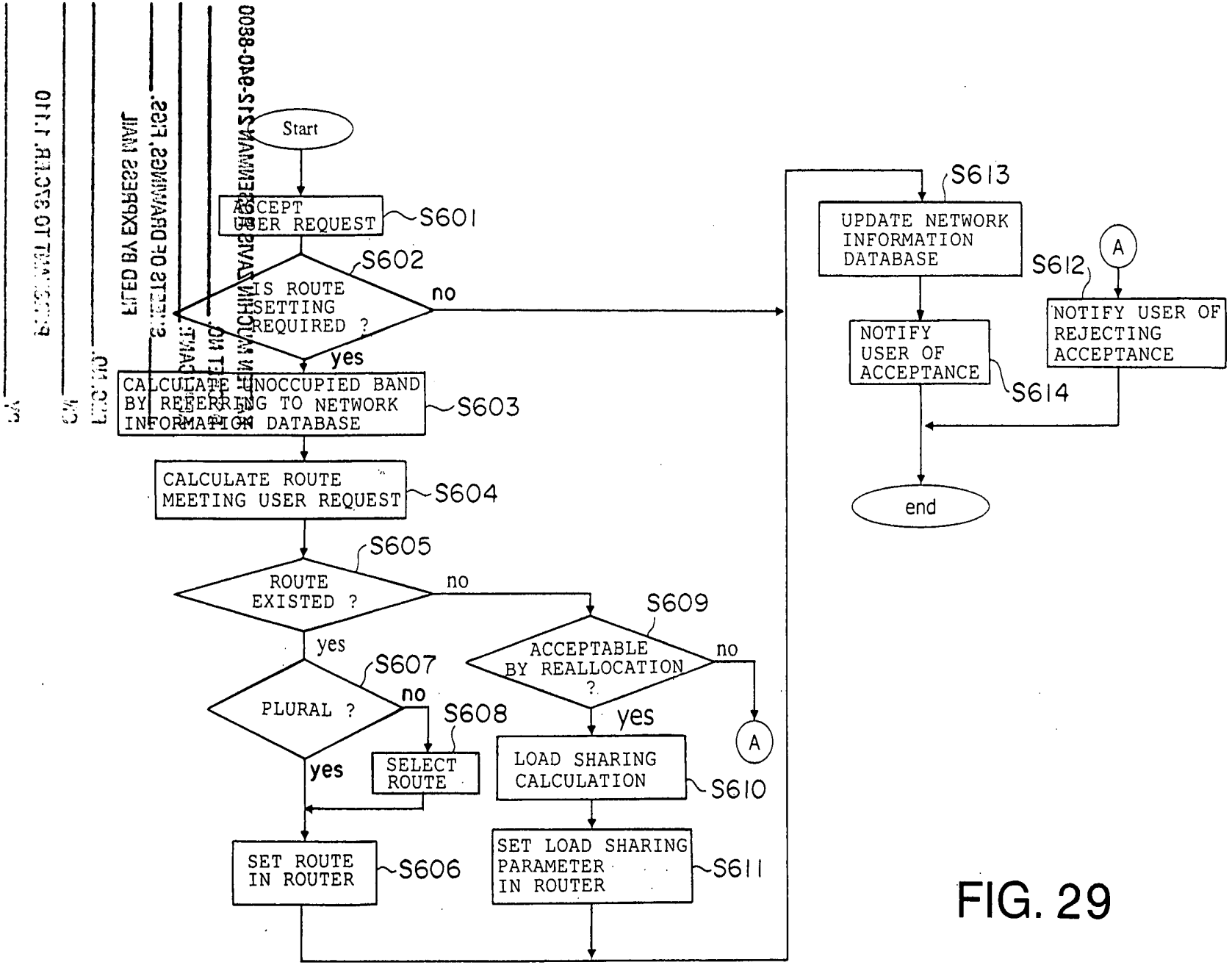

Start
ACCEPT USER REQUEST
S601
S602
IS ROUTE SETTING REQUIRED ?
no
yes
CALCULATE UNOCCUPIED BAND BY REFERRING TO NETWORK INFORMATION DATABASE
S603
CALCULATE ROUTE MEETING USER REQUEST
S604
S605
ROUTE EXISTED ?
no
yes
S607
PLURAL ?
no
yes
S608
SELECT ROUTE
SET ROUTE IN ROUTER
S606
S609
ACCEPTABLE BY REALLOCATION ?
no
yes
A
LOAD SHARING CALCULATION
S610
SET LOAD SHARING PARAMETER IN ROUTER
S611
S613
UPDATE NETWORK INFORMATION DATABASE
S612
A
NOTIFY USER OF REJECTING ACCEPTANCE
NOTIFY USER OF ACCEPTANCE
S614
end

FIG. 29